

mental plants that is capable of producing results comparable to or better than standard peat-based media, questions of availability become more important. In Broward County, Florida, (where this research was conducted), 17,020 yd³ of heat-treated sewage sludge, 25,985 yd³ of dried but not heat-treated sewage sludge, and 140,594 yd³ of liquid sewage sludge were produced in 1979 by nearly 100 sewage treatment plants (9). Liquid content of heat-treated sludge is ca. 75%, dried sludge ca. 65% and liquid sludge ca. 98%, so if all of this material were composted a total of 26,937 yd³ of compost (ca. 40% liquid) could be produced in one year. It seems very likely that local or regional horticultural uses would have little difficulty in exploiting this resource.

Increased utilization of urban wasteproducts such as composted sewage sludge in ornamental horticulture would have numerous benefits. It would insure growers of a readily-available, locally-produced, inexpensive, humus-like material which would produce adequate or superior growth characteristics for many ornamental crops. It would also eliminate many of the disposal and potential pollution problems associated with urban sludge lagoons and landfills. The composting process converts raw sludges into a product that is easy to handle, stable, and safe. Research results in this and other studies support its expanded use in ornamental horticulture.

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SHIFTING PRODUCTION AND CONSUMPTION PATTERNS IN THE TROPICAL FOLIAGE PLANT INDUSTRY¹

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Abstract. Despite the rapid rise in foliage plant production and consumption during the early and mid-1970s, the real value of foliage plants produced in the United States has been declining since 1977. Despite a continuation of the upward trend in terms of current dollars, industry sales have been trending downward for the past three years when measured in terms of money of constant value. Although there was a rise from 96¢ in 1970 to \$3.99 in 1980 in estimated per capita consumption valued in constant 1980 dollars, a high of \$5.28 was reached in 1977. This was followed by a decline to \$3.99 in 1980. Various reasons, including a decrease in construction of homes, apartments, commercial buildings and shopping centers, a shift in demand from foliage plants to potted flowering plants, and other factors, have been advanced to explain the recent drop in demand for foliage plants.

During the decade of the 1970s the tropical foliage in-

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dustry in the United States increased its size at a rate probably faster than that of any other sector of U.S. agriculture. Growth in the southern tier of states—Florida, California, and Texas—was also accompanied by industry expansion in some northern states.

A demand explosion for foliage plants in the '70s brought, in addition to a plethora of many new growers, fresh investment capital, new transportation and production input agencies, the organization of distribution agencies in terminal market centers to serve retail outlets in the surrounding area, an expansion in plant species, and a host of other changes. Among the other changes were the entry of conglomerates, the increased production of plant propagating material in the tropics, the entry of specialized plant stores as another retail marketing agency, the growth and marketing of larger plants for use in shopping malls, places of business, etc.

The purpose of this paper is to analyze production and consumption patterns for foliage plants in the United States. Also included is an analysis of the relationship between the consumption of foliage plants and other floral-cultural products and per capita disposable income.

Production Patterns

In terms of 1980 constant dollars, foliage plant production in the United States increased from \$68 million in 1949 to a high of \$381 million in 1977, but dropped to \$296 million in 1980 (Table 1). The level in 1977 represented

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a 462% rise over that in 1966, the first year in which the Crop Reporting Board made its annual estimates of the value of foliage plant production. The value of production, in terms of constant dollars, declined 22% from 1977 to 1980.

Table 1. Total and per capita actual and adjusted net wholesale sales of tropical foliage plants in the United States, 1966 to 1980 (5, 6).

Year	Actual sales		Adjusted ^z sales	
	Total	Per capita ^v	Total	Per capita ^v
	\$1,000	\$	\$1,000	\$
1966	25,166	.13	67,832	.35
1967	26,079	.13	70,105	.35
1968	26,412	.13	69,323	.35
1969	29,158	.14	73,631	.36
1970	27,692	.14	67,377	.32
1971	37,586	.18	88,646	.43
1972	48,428	.23	109,318	.52
1973	66,119	.31	131,974	.63
1974	113,503	.54	190,441	.90
1975	184,398	.87	284,022	1.33
1976	243,759	1.13	357,943	1.66
1977	275,300	1.27	381,302	1.76
1978	281,919	1.29	361,899	1.65
1979	383,928	1.29	324,119	1.47
1980	295,943	1.33	295,943	1.33

^zActual data converted to 1980 prices through use of Index of Producer Prices (all commodities).

^vTotal sales divided by total population.

The percentage changes in the value, in constant 1980 dollars, of foliage plants produced in four major states in selected periods is shown in Table 2.

Table 2. Percentage changes in the value, in 1980 constant dollars, of foliage plants produced in selected states in the periods 1966-77 and 1977-80.

State	Period	Percentage change
Florida	1966-1977	+ 379
	1977-1980	- 19
California	1966-1977	+1088
	1977-1980	- 22
Texas	1966-1977	+ 977
	1977-1980	+ 6
Ohio	1966-1977	+ 290
	1977-1980	- 18
U.S.	1966-1977	+ 462
	1977-1980	- 22

Source: (4, 5).

While the value of foliage production was increasing in most states over the 1966-1977 period, the rate of growth in various states showed much variation. The percentage of the U.S. value of foliage plants produced in selected years in these four states is shown in Table 3.

Table 3. Percentage of the U.S. foliage crop in selected states, 1966, 1977, and 1980.

State	Year	% of total
Florida	1966	51.1
	1977	43.6
	1980	45.2
California	1966	12.6
	1977	26.6
	1980	26.7
Texas	1966	3.4
	1977	6.5
	1980	8.8
Ohio	1966	6.0
	1977	4.2
	1980	4.4

Source: (6).

Despite increases (in current dollars) in the annual value of foliage plants produced in the United States during the past 10 years, there has nevertheless been a decline in real terms since 1977. Decreases since 1977 have been more marked in Florida and California than in other states.

Indicative of the changing patterns of firm growth and management, the following figures (with monetary values shown in terms of constant 1979 dollars) denoting various average relationships for the same 5 nurseries in Central Florida over selected years from 1970 to 1979 are shown in Table 4.

Table 4. Various relationships for the same 5 nurseries in central Florida, selected years, 1970 to 1979.

Year	Net nursery income	Return to capital	Cost per \$	Value of	Own
			of sales & inven. value change	own plants sold per sq. ft. of area	plants sold per employee
	\$1,000	%	¢	\$	\$
1970	85	13.0	95.9	2.47	18,985
1973	238	35.9	87.9	3.32	24,330
1975	52	0.3	100.7	5.23	23,385
1976	181	21.4	93.6	4.59	26,346
1977	152	18.6	93.7	4.59	22,744
1978	43	2.6	105.8	3.91	19,224
1979	110	11.1	10.2	3.72	19,909

Source: (4).

Consumption Levels

Growth and Decline in Consumption

In terms of current dollars per capita expenditures for foliage plants rose from 38¢ in 1966 to \$3.99 in 1980. Every year the level was higher than or equal to the level of the preceding year. When this set of figures was adjusted to take into account the changes in the price level, there were four years—1970, 1978, 1979, and 1980—in which the level of per capita expenditures was less than the preceding one.

In constant value terms, per capita expenditures rose from \$1.05 in 1966 to \$4.28 in 1977—an increase of 403%—and then fell to \$3.99 in 1980.

Table 5. Consumer expenditures for foliage plants, consumer expenditures for floricultural items other than foliage, and per capita disposable income (all converted to 1980 dollars).

Year	Consumer expenditures for		Per capita disposable income
	Foliage	Floricultural products other than foliage	
	Dollars		
1966	1.05	19.51	6,632
1967	1.05	20.59	6,807
1968	1.05	21.83	7,005
1969	1.08	22.70	7,099
1970	.96	22.79	7,204
1971	1.29	23.77	7,393
1972	1.56	25.45	7,653
1973	1.89	24.20	8,063
1974	2.70	21.06	7,876
1975	3.99	19.74	7,859
1976	4.98	19.93	8,032
1977	5.28	20.26	8,226
1978	4.95	21.46	8,444
1979	4.41	21.46	8,446
1980	3.99	20.70	8,176

Source: (2, 5, 6).

Various reasons have been cited for the tremendous spurt in foliage plant demand during the 1970s. They include (3):

1. The environmental movement, with its emphasis on growing green plants.
2. The innate desire of people to possess and grow living things.
3. A rise in population numbers.
4. Larger numbers of apartment dwellers.
5. More leisure time.
6. The fuel crunch, encouraging people to stay at home more.
7. The increased availability of foliage plants through new and continuing outlets.
8. The tendency to follow peer group leaders in having plants.
9. Advertising, promotion, and public relations activities on the part of national trade associations, private sales firms, and other groups.

One may ask what factors brought about the drop in demand for foliage which has occurred in the past several years. The author knows of no study which delineates such reasons, but a number of hypotheses are offered. One is a shift in consumer preferences from green foliage plants to potted flowering plants. Another is the decline in the rate of shopping mall construction as many plants, especially large ones, are used in such structures. In addition, there were decreases in the construction of homes, apartments, and other buildings. Shifts in the interests of college and other students from concern with the environment and various outside activities to a more highly intensified interest in academics may have brought about a lessened interest in green plants. Despite a real rising per capita disposable income, consumers have doubtless cut back on plant purchases, a product viewed by many as a luxury rather than a necessity, and made decisions to save, invest, or spend their money for food, clothing, housing, transportation, recreation, and other "necessities" viewed as more essential than purchasing foliage plants. Other reasons may include poor quality materials and a saturation of the market.

Purchase Patterns

It is of interest to note that the proportion of the estimated sales of floricultural products accounted for by retail foliage purchases rose from a level of 4 to 5% during the late 1960s and continued upward to reach 17% in 1975 (2, 5, 6). The proportion was 20% or higher in 1976 and 1977, but dropped to 16% in 1980.

Data on the percentage composition of green plants and blooming plants in supermarkets, discount stores, and department stores in each month during the period from November 1978 through April 1980 are contained in Table 6. These data, released by The Floral Report, do not show monthly sales values.

It was anticipated that an upward trend in the relative importance of blooming plants would be apparent, but such a tendency did not stand out. Nevertheless, the relative movement of blooming plants rose in all three types of stores in December.

A preliminary regression analysis was done to relate consumer purchases of foliage plants to several important variables. It was hypothesized that per capita expenditures for foliage plants were negatively affected by the consumption of other floral products, i.e., that they were substitute products, and that increases in consumers' disposable personal incomes were accompanied by rises in per capita foliage plant sales. It was also hypothesized that a time trend variable would be a proxy for changes in consumers' tastes and preferences. Annual data were available for the 15 year period from 1966 through 1980. The model examined was:

Table 6. Share of green plants in marketing mix of floral sales in various outlets, selected periods.

Period	Supermarkets		Discount stores		Department stores	
	Green plants	Blooming plants	Green plants	Blooming plants	Green plants	Blooming plants
	Percent of total sales					
Nov. 1978	41	31	39	20	40	9
Dec. 1978	28	50	25	37	44	16
Jan. 1979	48	24	38	13	32	19
Feb. 1979	34	32	37	20	37	12
Mar. 1979	32	27	30	10	27	12
Apr. 1979	27	42	26	24	31	26
May 1979	30	36	28	18	28	16
June 1979	44	18	33	9	32	11
July 1979	42	22	33	7	31	5
Aug. 1979	40	13	36	8	34	5
Sept. 1979	57	13	41	5	33	10
Oct. 1979	53	14	44	5	35	5
Nov. 1979	40	28	34	12	37	10
Dec. 1979	28	50	22	40	28	33
Jan. 1980	39	25	45	7	42	12
Feb. 1980	37	28	33	12	53	7
Mar. 1980	25	46	28	25	36	22
Apr. 1980	29	43	31	17	45	13

Source: (1).

$$\log X_1 = \log a + \log X_2 + \log X_3 + X_4$$

where X_1 = annual per capita expenditures for foliage plants in 1980 dollars
 X_2 = annual per capita expenditures for floral products other than foliage plants, in 1980 dollars
 X_3 = consumer disposable income in 1980 dollars
 X_4 = time

Results were encouraging; the anticipated signs were obtained, but the high coefficients were larger than reasonable. This was probably due to multicollinearity and the small number of observations. Additional analyses will be done in the future, with data on the following, among others, to be considered as independent variables: percentage of women in the labor force, annual housing starts, and number or square footage of shopping centers constructed.

Foliage in the 1980s

Many factors, including economic trends, general shifts in consumer demand and purchasing patterns, and others will affect the direction and level of consumer purchases in the 1980s. It is possible that an industry public relations and promotion program, if activated on a national basis, may assist in expanding demand. It is also possible that various factors, which may be of only incipient importance today, may come to bear on foliage plant demand patterns and act to depress or increase foliage plant consumption during the 1980s.

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